

The relationship between financial distress risk and stock returns: Evidence from Sri Lanka

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Abstract

If financial foundation of the company is distressed and appears to be in bankruptcy, it can adversely affect all investors who are involved in business and financial partnerships with the company. As the main objective of this study, we have analyzed whether there is any significant difference between stock returns of a financially distressed company and non-distressed company. Altman Z-score model has been applied for measuring the financial distressed companies and categorization of companies in addition to the Multivariate Discriminate Analysis analytical technique. Data has obtained from 101 listed companies in Colombo stock exchange over a period of five years. From the 101 companies, 59 were identified as non-distressed and gray area firms, whereas 42 were categorized as financially distressed. The stock return has obtained for each company to check whether there is any significant difference between stock returns of a financially distressed company and financially non-distressed company. The results indicate that the financial distress risk is not affected to the stock return of the selected companies with the conclusion that there is not any significant difference between the stock returns of distressed companies over non-distressed companies. By looking individually and collectively at the return patterns of financially distressed and non-distressed companies, the study can be used effectively for successful decision-making for investors as well as corporate bodies when getting their investment decisions.

Keywords:- *Bankruptcy, Financial distress risk, Colombo stock exchange, Altman Z-score model, Stock returns*

1 Introduction

Going concern is one of the most important aspects of any given company from the viewpoint of an investor (Menon & Williams, 2010). As Agrawal and Chatterjee (2015) several metrics such as Altman's Z-score (Z-score) and distance-to-default (DD) are used to measure the financial distress risk and consequences of companies and show the probability of bankruptcy. In Sri Lanka, there is a high rate of business bankruptcy rate within the shorter period after implementation (Senevirathne & Kuruppu, 2017). Further, even large, listed companies also can be bankrupt. This will be evidenced by the companies that are under the watch list of the Colombo stock exchange (CSE) or the blacklisted companies. Basically, these kinds of

companies will approximately equal to 9% of the total listed companies in the CSE (CSE annual report, 2019). Therefore, there is a question of whether this financial distress risk will affect the stock returns of a selected company or is there any difference between the stock returns of a financially distressed company and a financially non-distressed company. When determining the distress situation of a company, Altman's Z-score model is one of the most prevalent models used in empirical world. The applicability of Altman's Z-score model in determining the financial distress risk within the Sri Lankan context is at a high level (Gunathilaka, 2014; Nires & Pratheepan, 2015; Vassalou & Xing, 2004). Therefore, as Gunathilaka

(2014) this study uses Altman's Z-score model as a predictive model of financial distress risk. After successfully identifying the financially distressed companies, it is observed the pattern of stock returns for the selected companies. The study test whether Altman's Z-scores can be recognized as a signal and whether investors change their portfolio decisions accordingly.

The main objective of this study is to identify, whether there is any significant difference in stock returns of a financially distressed company and a financially non-distressed company. This research has been backed by strong literature including some theories and various empirical studies that conclude conflicting results on the relationship between financial distress risk and stock returns. Some studies have mentioned that there is a positive relationship between financial distress risk and stock returns (Shen, Liu, Wang, & Zhou, 2020). Some studies depict that there is a negative relationship between financial distress risk and stock returns while some studies mention that there is no kind of relationship as well (Zaretsky & Zumwalt, 2007). Investors in CSE would be benefited from this analysis, as an investor can get an idea about what companies will not perform well in the near future in advance. Further investors can analyze the companies that will end up on the watchlist or the blacklist and avoid those from portfolios. Therefore, this study will successfully help to figure out whether Altman's Z-scores are recognized as a signal and whether investors change their portfolio decisions accordingly comparing it with the stock returns, without ending up with a loss.

The rest of the paper is structured as follows. The next section presents the recent literature. The third section is the methodology that describes the data, sample, and variables of the study. Forth section presents empirical results. Findings are

discussed in the fifth section which followed by the conclusions in the final section.

2 Literature review

Financial distress is a situation under which a corporation or individual is unable to produce enough profits or revenue, leaving it unable to satisfy or pay its financial obligations (Kulali, 2016). There are some major theories that can be used, based on both accounting and market-based variables including Z-score model of Altman (1968), O-score of Ohlson (1980), Merton's option pricing model of Vassalou and Xing (2004) and probability of failure of Campbell, Hilscher, and Szilagyi (2008) as a measures of financial distress risk. The Altman's Z-score is the outcome of a credit strength test the probability mainly in the bankruptcy of a publicly held corporations. The Altman's Z-score model is based on five financial ratios that can be determined from data taken from the annual reports of companies. In 2007, Altman estimated that the median Altman's Z-score among businesses was 1.81. This revealed that 50% of businesses were likely to have lower probability of bankruptcy. When it comes to Sri Lankan context there are few studies that have been carried out in relation to determine the good predictive model for financial distress of a corporation or to identify the financially distressed companies within the listed companies in CSE (Niresh & Pratheepan, 2015). As Gunathilaka (2014) Altman's Z-score model have a remarkable degree of accuracy in predicting financial distress risk in Sri Lankan context. In addition Gunathilaka (2014) captures this financial distress situations of the Sri Lankan companies using Multivariate Discriminate Analysis (MDA) as the analytical technique. As Kulali (2016) that Altman's Z-score model is the most common model among accounting-based bankruptcy forecasting models. Further, Niresh and Pratheepan

(2015) has concluded about the applicability of Altman's Z-score model in determining the financial distress risk within the Sri Lankan context at a high level.

Basic performance parameter of investment management is the stock return. The calculation offers a holistic view of an asset or investment's financial success which calls the investment's value. In simple, the total stock return can be identified as the return which investors receive when investing in the stock market and it can be received in two forms, as profit through the trading of shares (price returns) and as dividend provided by the companies. Altogether called the total return. Further, the estimate for the total return on stock is the price improvement plus any dividends paid, divided by the stock's original price. But in general, dividends are not fixed and mostly, those will be determined by the company profitability, liquidity or the dividend policy that have been practiced over time (Hallerbach, 2003). With that, there are three perspectives on stock returns. First, dividend policy is neither relevant nor requires specific estimation, second the amount of dividend is paid is linear to stock price and third there is a negative correlation between dividend policy and stock price, meaning that lower dividend results in higher stock price (Miller & Modigliani, 1961). In addition to this dividend irrelevance, in a further studies by Bello, Olarinde. and Abdullahi (2020) have concluded that dividend payments do not create wealth for shareholders, nor do they merely add value.

As Garlappi and Yan (2011) that default risk is a systematic risk and investors require a positive premium to bear such risk. As well as several papers such as Anginer and Yıldızhan (2018) has observed that financial distress risk increases equity returns. In addition to that, if a firm is facing higher financial distress risk, investors may

demand higher premiums and in general highest financial distress risk tend to give higher returns as the theory of risk-return trade off (Boubaker, Nguyen, & Rouatbi, 2016). The relationship between stock returns and financial distress risk will get negative in nature may be attributed to market mispricing by indicating there is no clear identification on financial distress risk whether it is systematic or unsystematic (Shen et al., 2020). As Garlappi and Yan (2011) revealed that financial distress risk is a systematic risk and investors will expect a premium for that.

As literature revealed, the relationship between financial distress risk and the stocks returns is much conflicted yet and no consistency in even with most recent studies. Further, when it comes to Sri Lankan context even though there were much research on identification of financially distressed companies or to test the accuracy of the Altman's Z-score model in predicting corporate bankruptcy, but there is a lack of research on how the stock returns of a financially distressed company behave or being determined with respect to other financially non-distressed companies within the market. Therefore, by undertaking this study about the relationship between financial distress risk and stock returns from Sri Lanka, provides a clear comparison about how the stock returns are determined among the financially distressed and financially non-distressed companies or whether there is any significant difference in stock returns of a financially distressed company and financially non-distressed company.

3 Methodology

There are some major theories and models that can be used based on the both accounting and market-based variables including Z-score of Altman (1968), O-score of Ohlson (1980), expected default frequency from Merton's option pricing model

from Vassalou and Xing (2004) and probability of failure of Campbell, Hilscher, and Szilagyi (2008) as a measures of financial distress risk. As per the justification gathered from the literature, Altman's Z-score model and the test methodology involves computing the Z-scores for all the companies obtained in the sample within the period of five years from 2015 to 2019. The data gathering period has selected based on the more stable macro-economic environment without major external shocks which consisted with average GDP growth of 3.7%, average CPI inflation 4.08% and stable GDP per capita (Focus Economics 2022). After that, based on the Z-score values calculated, companies have categorized as financially distressed, gray and financially non-distressed companies. As per the easiness, the gray area companies have also obtained under financially non-distressed companies because those are having less probability of become bankrupt in future (Altman, 1968). Then, based on the year that companies are financially distressed or financially non-distressed, the holding period return or the Table 1. Sample of the study

price return have calculated for the particular year. After calculating relevant independent and dependent variables, a detailed analysis has done by using the following models and formulas further. For this analysis, annual/interim financial reports of the selected companies over last five-year period 2015 to 2019 have used which were published on the CSE data library as secondary data. The summary of the selected sample based on the industry of 101 companies can be given as Table 1.

	Industry	No of Companies
01	Real estate	19
02	Utilities	7
03	Food Beverage	20
04	Consumer Service	20
05	Capital Goods	15
06	Material	15
07	Household and Personal Products	5
	Total	101

For this analysis, industries have considered as per the Global Industry Classification Standard (GICS) classification listed in the CSE. When obtaining industries, pharmaceuticals and biotechnology and life sciences, banks, diversified financials, insurance, commercial and professional services have excluded because of the different data representing methods as well as insufficient

information availability (Gunathilaka, 2014). When determining a company financial distress situation, one of the most widely used models is Altman's Z-score model. As per the studies concluded by (Gunathilaka, 2014; Niresh and Pratheepan, 2015; Vassalou and Xing, 2004) the applicability of Altman's Z-score model in determining financial distress risk within the Sri Lankan context is high.

Further, association between financial distress risk stock returns in Sri Lanka is inclusive. There is a favorable association between financial distress risk and stock returns, (Shen et al., 2020). However, some research show that there is a negative association between financial distress risk and stock returns, but others show that there is no relationship at all (Zaretzky & Zumwalt, 2007). Consequently, following hypothesis developed to test from the analyses.

H₁: There is a significant difference in relationship between financial distress risk and stock return among financially distressed and financially non-distressed companies

Data which gathered from the annual reports of the public listed companies screened and cleaned analyzed by using IBM Statistical Package of

Social Sciences (SPSS 26). Descriptive statistics and inferential statistics have used mainly in testing hypothesis and reaching conclusion.

Altman's Z-score Model

This model was developed by Edward Altman in 1968 using financial statement ratios and multiple discriminant analysis (MDA) to predict bankruptcy for publicly traded companies. The MDA model is used to demonstrate that the factors utilized in the MDA Altman's Z-Score approach are the most effective for forecasting financial distress. As shown in below equation the MDA of Altman's Z-Score is based on five financial measures namely WCTA, TETA, EBITTA, MVEBVD, and STA (Ishmah, Solimun, & Mitakda, 2019).

$$Z\text{-Score} = 1.2 \text{ WCTA} + 1.4 \text{ RETA} + 3.3 \text{ EBITTA} + 0.6 \text{ MVEBVD} + 1 \text{ STA}$$

Definition of the variables that has used in the model and decision criteria are explained in Table 2 and Table 3.

Table 2. Variables of the study

Abbreviation	Measurement
WCTA	working capital /total assets ratio, working capital to gross assets compares the net liquid assets to the firm's total assets.
RETA	retained earnings/ total assets, as a percentage of total assets, this calculates gross profitability over time.
EBITTA	earnings before interest and taxes/ total assets (EBIT/TA), is a ratio which calculates the earnings before interest and taxes (EBIT) of a corporation in relation to its total assets.
MVEBVD	market value of equity / book value of liabilities ratio, indicates how the company assets can be weakened in terms of value or the asset deterioration of the company.
STA	sales / total assets, is the level of asset turnover calculates the value of the sales or earnings of a company according to the value of its assets.

Table 3. Decision criteria

Altman's Z-Score	Meaning of the cut-off points	Results
Z > 2.99	safe	safe/bankruptcy is unlikely
1.81 < Z < 2.99	gray zone	stable/cannot predict
Z < 1.81	financially distressed	likely to be bankrupt

Source. Altman, 1968

For this analysis, as a method of calculating stock returns, the holding period returns for the year which the companies were distressed have obtained. The stock return calculated only capturing the price return or the loss of a stock within the relevant period. The issues relating to the calculations of stock returns (the effect of stock splits, scrip dividend, dividend announcements on stock price) have ignored. The return has calculated using below equation by obtaining the relevant beginning (P_{t-1}) and the ending prices (P_t) which are already adjusted for those kinds of events happened during the relevant year.

$$\text{Stock Return} = \frac{P_t - P_{t-1}}{P_{t-1}}$$

When comparing the means of precisely two groups, financially distressed and financially non-

distressed use an independent samples t test. This test is often used to see if the means of two populations vary. This is an inferential statistical hypothesis test, which means it draws inferences about populations using samples. Therefore, in this study, difference between the mean returns of financially distressed and financially non-distressed companies have compared. (Gondan, Rochon, & Kieser, 2012). Correlation coefficient has obtained for each variable to identify the association between obtained variables as well. A graph is a visual representation of ordered data that aids readers in better understanding complicated material. In this research, line chart has used to explain the relationship between Altman's Z-Score and the stock return for the simple understanding purpose.

4 Data analyses

Descriptive Statistics for all variables and descriptive statistics for dependent variable (stock return) and main independent variable (Altman's

Z-score) are presented in Table 4. The results of independent sample t-test are presented in Table 5.

Table 4. Descriptive statistics

	Mean	Std. Deviation	N
Stock return	-0.054	0.287	101
Z score	5.42	12.63	101
Return (Rs.)	Financially non-distressed	Mean	-0.015
		Std. Deviation	0.310
		Minimum	-0.53
		Maximum	1.16
	Financially distressed	Mean	-0.0109
		Std. Deviation	0.243
		Minimum	-0.62
		Maximum	0.93

Table 5. Group Statistics

	Distressed statues	N	Mean	Std. Deviation	Std. Error Mean
Return	Non-Distressed	59	-0.0151	0.31007	0.04037
	Distressed	42	-0.0109	0.24389	0.03763

According to the Table 4 the average return of a company obtained within the sample for the study has shown a negative return of -5.45% and this can be varied within the $\pm 28\%$ range. (M = -5.45%, SD = 28%), The average of Altman's Z-score for the sample is 5.42 and this Z – Score value can be varied by $\pm 126\%$ range (M = 5.42, SD = 126%). Further, an average return of a financially non-distressed company is -1.5% and can be varied within the range of $\pm 31\%$ (M = -1.5%, SD = 31%). When it comes to the other category, which is financially distressed companies, it shows an average return of a company is -1.09% which is also a negative figure or the reduction in share value relative to its previous year value and this

value also can be varied within the range of $\pm 24\%$ (M = -1.09%, SD = 24%).

Independent Sample T-Tests for the financially distressed and financially non-distressed companies in terms of stock returns are presented in Table 5. In the output shows in above Table 5, within the total sample of 101 companies, there are 42 financially distressed companies and altogether 59 financially non-distressed companies. Further, the results have shown there is a negative average return for both financially distressed -1.09% (M = -1.09%, SD = 0.24) and financially non-distressed (gray and safe) -1.51% (M = -1.51%, SD = 0.31) companies, respectively.

Table 6. Independent sample t-test

		Levene's Test for Equality of Variances		t-test for Equality of Means							
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference		
										Lower	Upper
Return	Equal variances assumed	2.18	0.14	1.64	99	0.102	0.094	0.05744	-0.019	0.208	
	Equal variances not assumed			1.71	97.95	0.089	0.094	0.05519	-0.014	0.204	

Table 7. Correlation analyses

		Z
Pearson Correlation	Stock Return	0.027
Sig. (1-tailed)	Z	
	Stock Return	0.393
	Z	.

As per the above Table 6 the study has found that the returns of the financially distressed companies are indifference compared to return at the end of the relevant financial year (M = -1.09%, SD =

0.24) than of the financially non-distressed (gray and safe) companies (M = -1.51%, SD = 0.31), t (99) = 1.64, p > 0.05, while not supported the null hypothesis.

According to Table 7, the correlation between the stock returns and Z-score have indicated an insignificant very low positive relationship, $r(99) = 0.027$, $p > 0.05$. which is consistency with the findings of Anginer and Yıldızhan (2018).

Figure 1. support the results obtained through the statistical analysis which is there is not any statistically significant relationship between the stock return and the Altman's Z-score value. On the other hand, it tells there is not any difference between the stocks returns of financially distressed companies over financially non-distressed companies.

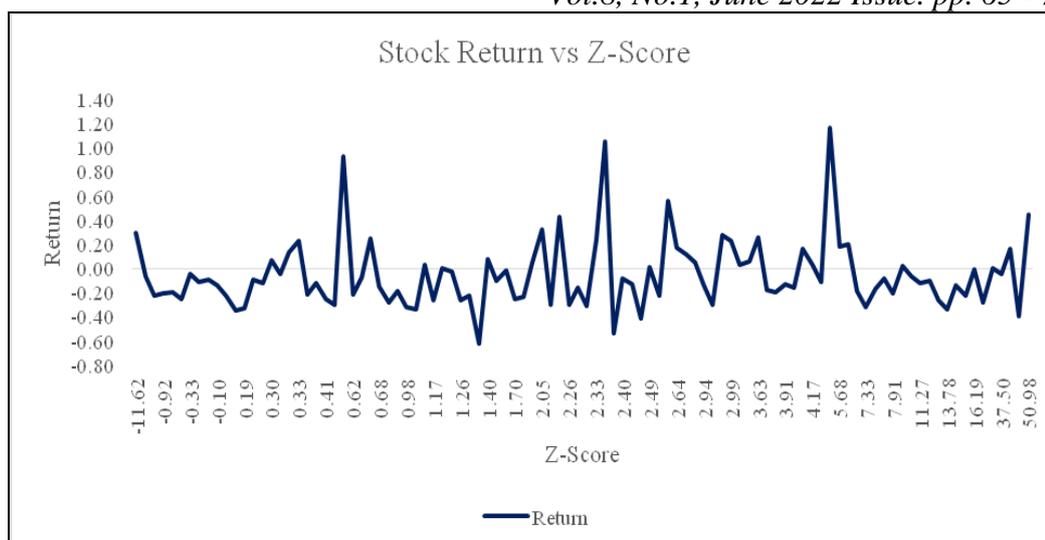


Figure 1. Graphical relationship between stock returns and Z-score

5 Discussion

The key topic of this analysis is to identify, whether there is any significant difference in stock returns of a financially distressed company over financially non-distressed company. Data analysis with 500 observations have implemented in the analysis to resolve this problem or to achieve the above-mentioned objective. As a measure of financial distress risk, Altman's Z-score value was obtained. If Altman's Z-score is lesser than 1.81 it is considered as a financially distressed company and if it is above the 1.81, it is considered as a non-distressed company. According to the results of the analysis, the average Altman's Z-score value of the entire sample of companies were 5.42 which also indicates most of the companies (52) within the obtained sample are financially non-distressed companies. Further, the average stock return of a particular company was -5.4% which also indicates stock returns of most of the companies within the sample are negative in nature or the share value has fallen within the one-year period. In addition to that, when the stock returns are analyzed based on the Altman's Z-score, results have shown that the

financially distressed company's average stock returns were -1.1% and the financially non-distressed company's stock returns were -1.51% consequently there was not any significant difference in stock returns of a financially distressed company over financially non-distressed company but there is marginally less negative return for the financially non-distressed companies. when it comes to correlation analysis, it shows weak positive relationship between the stock returns and Altman's Z- score value by having 0.027 correlation coefficient. It can be simply described as if Altman's Z-Score is increase, the company is most likely to be a safe (financially non-distressed) company which doesn't have the risk of bankruptcy in near future and its returns will increase with the safeness or the stock returns will increase in weak positive manner. Finally, based on the tested model it is also showed insignificant positive coefficient for this Altman's Z-score and stock return relationship by consistent with the findings of Anginer and Yıldızhan (2018).

The results have given some clear evidence regarding the main objective by indicating that the association between stock returns and the

probability of financial distress appears to be consistent with some previous studies' findings of (Anginer and Yıldızhan, 2018; Vassalou and Xing, 2004; Friewald et al. 2014) as these studies document there in no difference between returns of financially distressed company and financially non-distressed (gray and safe) company. When the company's financial structure is weak and tends to be in bankruptcy, any individuals interested in corporate and financial dealings with the company will be negatively affected. Further, if it's a listed entity, the owners or the shareholders will get panic and try to remove their ownership with the intention of safeguarding their capital before the bankruptcy occur, which will lead to reduction of share price over the period due to high selling pressure in the market. This will eventually lead to the negative price return for most of the investors in that company. Further, the results are inconclusive as the positive negligible coefficient of distress risk found is statistically insignificant, revealing that distress risk is generally attributable to the price, implying that there may be no meaningful relationship between the Altman's Z-score and the stock returns in terms of price return between financially distressed and financially non-distressed companies are indifference to each other.

6. Conclusion

The objective of this study was to identify, whether there is any significant difference between stock returns of a financially distressed company and financially non-distressed company. When the stock returns are analyzed based on the Altman Z-score, results have shown that there is no any significant difference in stock returns of a financially distressed company over financially non-distressed company but there is marginally less negative return for the financially non-distressed

companies. Even it shows weak positive relationship between the stock returns and Altman's Z- score value when it comes to correlation analysis. Thus, it is concluded that distress risk is not affected to the stock return of the selected companies and no significant difference between the stock returns of financially distressed company over financially non-distressed company. However, financial distress risk factor shouldn't be ignored by investors before investing. This study will open potential fields for scholars who are involved in researching the possibility of financial distress and other emerging market anomalies in their future research. Through looking individually and collectively at the return patterns of financially distressed and financially non-distressed companies, the study can be used effectively for successful decision-making for investors as well as corporate bodies when getting their investment decisions.

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